

## Claims

We claim:

1. An electromechanical sparring partner comprising:

a base including legs that provide support such that a the electromechanical sparring partner can throw and receive punches;

a torso connected to said base and including a torso movement assembly for turning and tilting said torso about an axis;

a right arm including an upper and lower arm portion and connected to said torso, said right arm further including a right arm actuation assembly for raising, lowering, extending and retracting said right arm;

a left arm including an upper and lower arm portion and connected to said torso, said left arm further including a left arm actuation assembly for raising, lowering, extending and retracting said left arm;

a controller connected to the torso movement assembly, the right arm actuation assembly, and the left arm actuation assembly and for controlling an operation of each assembly; and,

a power supply for providing power to said controller.

2. The electromechanical sparring partner of claim 1 wherein at least one of said right and left arm actuation assembly includes:

a first motor mount plate;

a first motor including a first motor shaft and for raising and lowering an arm mounted to said fixed motor mount plate;

- a gear having teeth and coupled to said shaft;
- a second motor mount plate including teeth in communication with the gear and pivotally connected to said first motor mount;
- a second motor including a second motor shaft mounted on said rotating motor mount plate;
- an upper arm frame member affixed to said second motor shaft;
- a catch linkage affixed at an end to said second motor shaft;
- an extend and retract linkage having a first end and a second end, said extend and retract linkage pivotally connected to at the first end to said catch linkage;
- a lower arm frame member pivotally connected to said upper arm frame member and the second end of said extend and retract linkage.

3. The electromechanical sparring partner of claim 1 wherein said torso movement assembly comprises:

- a torso shaft connected to a torso at one end;
- a first motor coupled to said torso shaft for tilting said torso shaft in a first direction;
- a second motor coupled to said torso shaft for tilting said torso shaft in a second direction wherein said second direction is perpendicular to said first direction; and,
- a third motor coupled to an end of said torso shaft opposite said torso, said third motor for twisting the torso shaft about a axis.

4. The electromechanical sparring partner of claim 3 wherein said torso movement assembly further comprises:
- a first rocker linkage including a first and second end, said first end connected said first motor;
  - a first tie rod linkage having two ends, one end connected to said first rocker linkage opposite the first motor and an opposite end connected to said torso shaft;
  - a second rocker linkage including a first and second end, said first end connected to said second motor; and,
  - a second tie rod linkage having two ends, one end connected to said first rocker linkage opposite the second motor and an opposite end connected to said torso shaft.
5. The electromechanical sparring partner of claim 4 wherein said first and second tie rod linkages include ball joints at either end.
6. An anatomically correct electromechanical sparring partner including at least structural components of a head, a torso, at least one arm and a base, said sparring partner comprising:
- means for raising an arm connected to said torso;
  - means for straightening and bending the arm connected to said torso;
  - means for tilting said torso; and,

means for twisting said torso.

7. The anatomically correct electromechanical sparring partner of claim 6 comprising a covering consisting of one or more selected from a group of polymer and elastomeric derivatives.

8. The anatomically correct electromechanical sparring partner of claim 6 wherein said means for raising the arm includes an electric motor arranged in said torso such that the electric motor is energized to raise the arm.

9. The anatomically correct electromechanical sparring partner of claim 6 wherein said structural components comprise materials consisting of one or more selected from a group of metallic, plastic and elastomeric materials.

10. The anatomically correct electromechanical sparring partner of claim 6 wherein said means for tilting the torso tilts the torso in a side-to-side direction.

11. The anatomically correct electromechanical sparring partner of claim 6 wherein said means for tilting the torso tilts the torso in a front-to-back direction.

12. The anatomically correct electromechanical sparring partner of claim 6 wherein said means for tilting the torso includes one or more selected from a group consisting of linear actuators, direct drive modules and motors.

13. The anatomically correct electromechanical sparring partner of claim 6 wherein said means for twisting the torso includes one or more selected from a group consisting of linear actuators, direct drive modules and motors.

14. A electromechanical sparring partner for throwing an array of punches towards a fighter comprising:

a torso that twists about an axis and tilts with respect to said axis;

arms connected to said torso, said arms raise, extend and retract such a variety of punches may be thrown by the robotic sparring partner; and,

a base connected to said torso for providing a stable platform.

15. The electromechanical sparring partner of claim 14 wherein said torso includes one or more selected from a group consisting of linear actuators, direct drive modules and motors.

16. The electromechanical sparring partner of claim 14 further comprising two motors and a solenoid for raising, extending and retracting said arms.

17. The electromechanical sparring partner of claim 14 further comprising three motors connected to and position within the torso for tilting and twisting said torso.

18. The electromechanical sparring partner of claim 14 further comprising at least one sensor for detecting a position of a fighter and responding thereto.

19. The robotic electromechanical partner of claim 14 further comprising an array of sensors for detecting when a punch strikes said robotic sparring partner.